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(54) **Shielded cable connector and method for connecting a shielded cable to it**

(57) In a method for connecting a connector to a shielded cable, the cable having a plurality of wires, a common shielding and an outer jacket, the wires and the shielding are exposed at one end of the cable. A first sleeve-like body is provided on the outer jacket near the exposed shielding and the exposed shielding is laid on the first body. A second sleeve-like body is mounted on the first body to thereby clamp the exposed shielding between both bodies. The first body is mounted on the outer jacket by crimping an axial section of the first body at its end directed away from the exposed shielding, and the second body is crimped on the first body with an axial section at its end adjacent the exposed wires covering at most the non-crimped section of the first body.

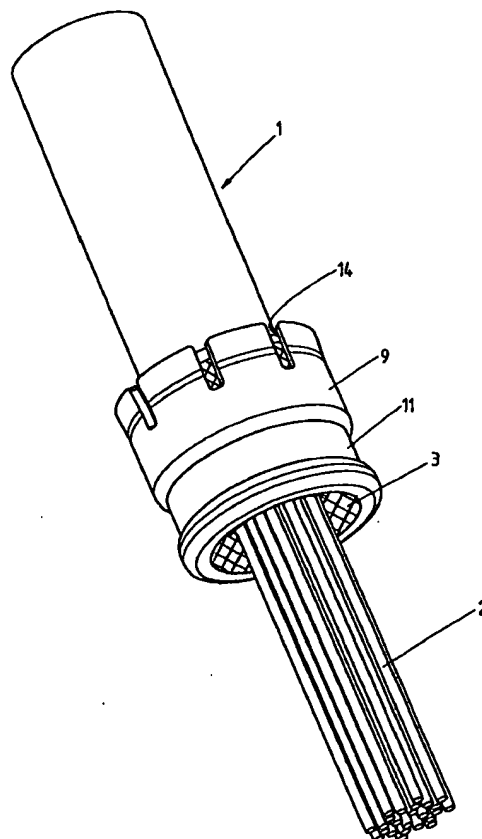


fig.4

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Description

[0001] Method for connecting a shielded cable to a connector, cable connector with a shielded cable and cable connector parts to be used in said method.

[0002] The invention relates to a method for connecting a connector to a shielded cable, said cable having a plurality of wires, a common shielding and an outer jacket, comprising exposing the wires and the shielding at one end of the cable, providing a first sleeve-like body on the outer jacket near the exposed shielding, laying the exposed shielding on the first body and mounting a second sleeve-like body of conductive material on the first body to thereby clamp the exposed shielding between both bodies. The invention further relates to a cable connector with a shielded cable and to cable connector parts to be used in the method.

[0003] Such a method, cable connector and cable connector parts are shown for example in EP-A-0 694 989, fig. 5 and 6. The first body is a plastic sleeve having an inner diameter sufficient to receive the outer jacket of the cable. The shielding, generally made as braided metallic wires, is clamped between the plastic sleeve and the second conductive body.

[0004] US-A-4 902 249 discloses a method for connecting a connector to a shielded cable, wherein an inner ferrule is mounted on the exposed shielding, the shielding is laid on the inner ferrule and the shielding laid back on the inner ferrule is covered by a conductive layer such as a copper foil.

[0005] The invention aims to provide an improved method of the above-mentioned type.

[0006] According to a first aspect of the invention, the method is characterized in that the first body is mounted on the outer jacket by crimping an axial section of the first body at its end directed away from the exposed shielding, and in that the second body is crimped on the first body with an axial section at its end adjacent the exposed wires covering at least partially the non-crimped section of the first body.

[0007] In this manner the first body is fixed in position on the outer jacket before mounting the second body, whereas the second body is crimped on a non-crimped section of the first body so that a good electrical connection between the first and second bodies can be obtained without exerting high forces on the cable. The forces exerted on the cable for fixation of the inner body can be determined in an accurate manner to fix the inner body in position and to provide a desired strain relief of the cable through locking the body/bodies within a hood of the connector.

[0008] According to a second aspect of the invention a cable connector is provided with a shielded cable having a plurality of wires, a shielding and an outer jacket, said cable connector comprising a housing of insulating material accommodating a plurality of contacts connected to said wires, and a hood of conductive material connected to the cable shielding, wherein a first sleeve-

like body is provided on the outer jacket and a second sleeve-like body of conductive material is mounted on the first body, the cable shielding being clamped between both bodies, characterized in that an axial section of the first body directed away from the insulating housing is crimped on the outer jacket, in that an axial section of the second body is crimped on the first body, the axial section of the second body covering at least partially the non-crimped section of the first body, and in that the bodies are received within a chamber of the hood having a stop co-operating with at least one of the bodies to lock the bodies in the hood.

[0009] According to a further aspect of the invention cable connector parts for use in the method of the invention are provided, comprising an insulating housing accommodating a plurality of contacts, first and second hood parts of conductive material, a first sleeve-like body and a second sleeve-like body, at least the second body being made of conductive material, characterized in that the second body comprises a cylindrical and a conical part, at least said conical part having a plurality of axial slots which are open at one end to provide a plurality of spring-type legs.

[0010] The invention will be further explained by reference to the drawings in which an embodiment of the method and cable connector of the invention is schematically shown.

Fig. 1-9 show subsequent steps in an embodiment of the method of the invention for connecting a connector to a shielded cable, wherein fig. 6 and 7 show perspective views of a hood part of the connector and fig. 9 shows the complete connector with shielded cable obtained by the method.

Fig. 10 and 11 show subsequent steps in an alternative embodiment of the method of the invention. Fig. 12 shows a connector part used in the method of fig. 10-11.

Fig. 13 and 14 show two hood parts of a connector used in a third alternative embodiment of the method of the invention.

Fig. 15 and 16 show subsequent steps in the third embodiment of the method of the invention.

[0011] Fig. 1 shows a shielded cable 1 having a plurality of wires 2, a common shielding 3 and an outer jacket 4. The shielding 3 is made of braided metallic wires. At one end of the cable 1 the wires 2 and the shielding 3 are exposed. A first sleeve-like body 5 made of a conductive material, for example a metallic ring is slid onto the outer jacket 4 such that one end of the body 5 extends beyond the outer jacket 4 along a short distance as shown in fig. 2. At the other end of the body 5, the body is fixed in position on the outer jacket 4 by crimping an axial section 6 on the outer jacket 4. In this manner the remaining section 7 does not clamp the outer jacket 4 and remains relatively flexible.

[0012] As shown in fig. 3, the exposed part 8 of the

shielding 3 is laid on the inner body 5, wherein it is guaranteed that the shielding 3 will contact the inner body 5 both at the outer circumferential surface and the end extending beyond the outer jacket 4. When the exposed shielding part 8 has been laid on the inner body 5, a second sleeve-like outer body 9 of conductive material is slid on the inner body 5 until an inwardly directed shoulder 10 at its end near the exposed wires 2 abuts against the exposed shielding part 8 at the corresponding end of the inner body 5. Thereafter an axial section 11 at the end of the outer body 9 near the exposed wires 2 is crimped on the exposed shielding part 8 supported by the non-crimped section 7 of the inner body 5. In this manner the shielding 3 is clamped with a high clamping force between the bodies 5, 9 without exerting high forces on the cable 1. A good electrical connection between the bodies 5, 9 and the shielding 3 is guaranteed.

[0013] Fig. 3 and 4 further show that the second or outer body 9 has a substantially cylindrical part 12 joining the inwardly directed shoulder 10 and a conical part 13 with slots 14 providing outwardly flaring spring-type legs 15. The purpose of these legs 15 will be explained hereinafter.

[0014] When the second body has been crimped on the first body to thereby clamp the exposed shielding part 8, the wires 2 of the cable 1 can be connected to IDC-type contacts 16 accommodated in an insulating housing 17 of a connector. The connector further comprises a hood including two hood parts 18, one of which is shown in fig. 6 and 7. The hood parts 18 are made of conductive material, wherein a covering plate 19 is mounted on one end of each hood part 18. The covering plate 19 is made of insulating material and covers the exposed parts of the contacts 16 when the housing 17 is mounted in the hood. As shown in fig. 6, the covering plate 19 is fixed on the hood part 18 by means of two wing parts 20 having a slot engaging oblique edges 21 of the hood part 18 and two lugs 22 engaging into openings 23 of the hood part 18.

[0015] Each hood part 18 is provided with a semi-cylindrical chamber 24 for receiving the outer body 9. This chamber 24 is limited in axial direction by a first shoulder section 25 and a second shoulder section 26. When the wires 2 are connected to the contacts 16, the insulating housing 17 is mounted in the lower end of the hood part 18 whereas the second body 9 is fittingly received in the chamber 24. The diameter in this chamber 24 is such that the spring-type legs 15 will be forced inwardly to guarantee a good electrical connection between the outer body 9 and the hood parts 18 and thereby between the shielding 3 and the hood parts 18. The axial length of the chamber 24 is such that the second body 9 is locked within the chamber 24 between the shoulder sections 25, 26, so that the bodies 5, 9 provide a strain relief for the cable 1. The strength of the strain relief can be determined by the force used to crimp the first body 5 on the outer jacket 4.

[0016] When the insulating housing 17 and the second body 9 have been mounted in the first hood part 18, an identical second hood part 18 is placed on top of the first hood part 18, wherein the hood parts 18 are fixed one to the other by rivets 27 for example.

[0017] As shown in fig. 8 and 9, before fixing the hood parts 18 one on the other, two bolts 28 are placed in respective bolt chambers 29 provided in wing sections 30 of the hood parts 18. The bolts 28 each comprise a head 31, a shaft section 32 and a screw thread section 33. The outer diameter of the shaft section 32 is smaller than the outer diameter of the head and screw thread section 33, respectively. Each bolt chamber has a passage 34 receiving the shaft section 32 with play, wherein however the diameter of the passage 34 is smaller than the outer diameter of the head 31 and screw thread section 33, respectively. In this manner the fixation bolts 28 are mounted in a loose-free manner without any further special provisions on either the hood parts 18 or the bolts 28.

[0018] Fig. 10-12 show an alternative embodiment of the method, connector and connector parts of the invention. Parts corresponding to the parts of the embodiment of fig. 1-9 are indicated by the same reference numerals.

[0019] In fig. 10, 11 the shielded cable 1, wires 2 and shielding 3 are only schematically indicated. Just as in the first embodiment, the wires 2 and shielding 3 are exposed at one end of the cable 1. Further the first body or inner ferrule 5 is mounted on the outer jacket 4 of the cable with one end extending beyond the outer jacket 4. The inner ferrule 5 is fixed on the cable 1 by crimping the axial section 6 on the outer jacket 4. In the present embodiment, the inner ferrule 5 is provided with a radially extending ring 35 at its end directed away from the exposed shielding 3.

[0020] When the shielding 3 is laid on the outer surface of the inner body 5, the second sleeve-like body or outer ferrule 9 is slid on the first body 5 until its inwardly directed shoulder 10 engages the corresponding axial end of the first body 5. In this embodiment the second body 9 is provided with slots 14 extending along the major part of the axial length of the second body 9 as shown in fig. 12, so that flexible legs 36 are obtained directed outwardly as shown in fig. 10.

[0021] The hood parts 18 are provided with a receiving chamber 24 for the outer ferrule 9, wherein at one end a slot 37 is provided for receiving the ring 35 of the inner ferrule 5. The diameter A of the chamber 24 near the slot 37 is smaller than the outer diameter B of the flexible legs 36 such that when the bodies 5, 9 are mounted in the chamber 24, the flexible legs 36 of the outer body 9 are pressed against the inner body 5 thereby clamping the exposed shielding part 8 between both bodies 5, 9. The ring 35 is received in the slot 37 so that the first and second bodies 5, 9 are locked within the hood parts 18 and a desired strain relief is obtained.

[0022] It will be understood that the wires 2 can be

connected to IDC-contacts 16 accommodated in an insulated housing 17 in the same manner as in the first embodiment of fig. 1-9.

[0023] Fig. 13-16 show a third embodiment of the method, connector and connector parts of the invention. Corresponding parts are indicated by the same reference numerals. The shielded cable 1, the wires 2, the shielding 3 and the outer jacket 4 are shown very schematically in fig. 15 and 16. In the same manner as in the first and second embodiments, the wires 2 and shielding 3 are exposed at one end of the cable 1 and the same inner ferrule 5 with a radial ring 35 at one end directed away from the exposed shielding 3 is mounted on the outer jacket 4 by crimping an axial section 6 on the outer jacket 4. In this case one end of the inner ferrule 5 is aligned with the end of the outer jacket 4. The exposed shielding part 8 is laid on the outer surface of the inner ferrule 5.

[0024] In the third embodiment a second sleeve-like body or outer ferrule 38 having a conical shape, is used. In cross-section the diameter of the outer ferrule 38 increases from a radially inwardly directed shoulder 39 at its end near the exposed wires 2 to the end directed away from the exposed wires. The inner diameter of the outer ferrule 38 near the shoulder 43 is approximately the same as the outer diameter of the inner ferrule 5.

[0025] In this third embodiment two hood parts 40 and 41 are used, which are shown in fig. 13 and 14, respectively. The hood part 40 is provided with a cylindrical receiving chamber 42 having an outer diameter A which is larger than the largest outer diameter B of the outer ferrule 38. A shoulder 43 of the hood part 40 provides a stop for the ring 35 of the inner ferrule 5. When the wires 2 are connected to contacts 16 of the insulated housing 17 (not shown), the inner and outer bodies or ferrules 5, 38 are placed in the receiving chamber 42 of the hood part 40 as shown in fig. 15.

[0026] The second hood part 41 is provided with a receiving chamber 44 and a slot 45 for receiving the ring 35 of the outer ferrule 5. The receiving chamber 44 has a conical shape corresponding to the conical shape of the outer ferrule 38, wherein the largest diameter of the receiving chamber 44 near the slot 45 corresponds to the largest diameter of the outer ferrule 38. When the second hood part 41 is mounted on the first hood part 40, the conical receiving chamber 42 will push the outer ferrule 38 towards the slot 45 so that the exposed shielding part 8 of the shielding 3 will be clamped between the outer body 38 and inner body 5. The inner and outer bodies 5, 38 are locked within the hood parts 40, 41 as the ring 35 is received in the slot 45 and engages the shoulder 43 of the first hood part 40. In this manner a strain relief is obtained.

[0027] It will be clear that the invention is not restricted to the embodiments described which can be varied in a number of ways within the scope of the claims.

Claims

1. Method for connecting a connector to a shielded cable, said cable having a plurality of wires, a common shielding and an outer jacket, comprising exposing the wires and the shielding at one end of the cable, providing a first sleeve-like body on the outer jacket near the exposed shielding, laying the exposed shielding on the first body and mounting a second sleeve-like body of conductive material on the first body to thereby clamp the exposed shielding between both bodies, characterized in that the first body is mounted on the outer jacket by crimping an axial section of the first body at its end directed away from the exposed shielding, and in that the second body is crimped on the first body with an axial section at its end adjacent the exposed wires covering at least partially the non-crimped section of the first body.
2. Method according to claim 1, wherein the first body is mounted on the outer jacket with one end of the first body aligned with or preferably extending beyond the outer jacket at the end adjacent the exposed shielding.
3. Method according to claim 1 or 2, wherein said second body is provided with an inwardly directed shoulder at one end, wherein said second body is placed on the first body with its shoulder against the shielding laid on the first body.
4. Method according to claim 1, 2 or 3, wherein the exposed wires are connected to contacts accommodated in an insulating housing of the connector, wherein the first and second bodies are mounted in a chamber of a first hood part of conductive material, wherein the insulating housing is mounted in a lower end of the first hood part and wherein a second hood part of conductive material with a corresponding chamber is mounted on the first hood part thereby locking the first and second bodies within said chamber and enclosing at least partially the upper part of the insulating housing.
5. Method according to claim 4, wherein a second sleeve-like body is used having flexible legs at its end directed away from the shoulder, wherein during mounting the bodies in the chambers the flexible legs are forced inwardly.
6. Method according to claim 4 or 5, wherein at least one fixation bolt is placed in a corresponding bolt chamber provided in the interface of the first and second hood parts, each bolt having a shaft section between bolt head and a screw thread section with a diameter smaller than the screw thread diameter, each bolt chamber having a passage for receiving

said shaft section, the diameter of said passage being smaller than the diameter of the screw thread and head of the bolt.

7. Cable connector with a shielded cable having a plurality of wires, a shielding and an outer jacket, said cable connector comprising a housing of insulating material accommodating a plurality of contacts connected to said wires, and a hood of conductive material connected to the cable shielding, wherein a first sleeve-like body is provided on the outer jacket and a second sleeve-like body of conductive material is mounted on the first body, the cable shielding being clamped between both bodies, characterized in that an axial section of the first body directed away from the insulating housing is crimped on the outer jacket, in that an axial section of the second body is crimped on the first body, the axial section of the second body covering at least partially the non-crimped section of the first body, and in that the bodies are received within a chamber of the hood having a stop co-operating with at least one of the bodies to lock the bodies in the hood.
8. Cable connector according to claim 7, wherein the second body is provided with spring-like legs at one axial end, wherein at least said legs are forced inwardly when the second body is received within said chamber of the hood.
9. Cable connector parts for use in the method of any one of claims 1-6, comprising an insulating housing accommodating a plurality of contacts, first and second hood parts of conductive material, a first sleeve-like body and a second sleeve-like body, at least the second body being made of conductive material, characterized in that the second body comprises a cylindrical and a conical part, at least said conical part having a plurality of axial slots which are open at one end to provide a plurality of spring-type legs.
10. Cable connector parts according to claim 9, wherein the second body is provided with an inwardly directed shoulder at its end opposite of the conical section.

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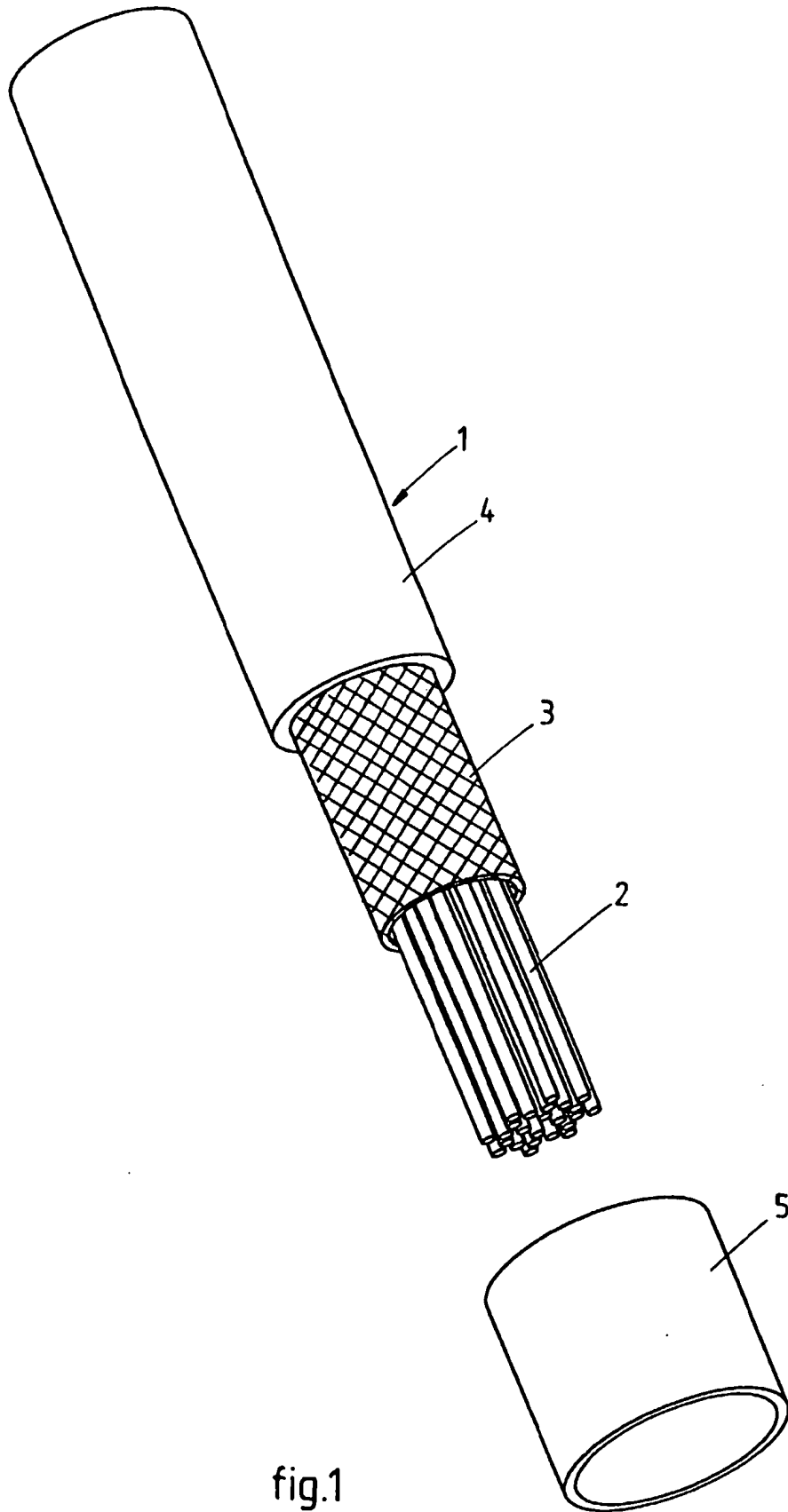


fig.1

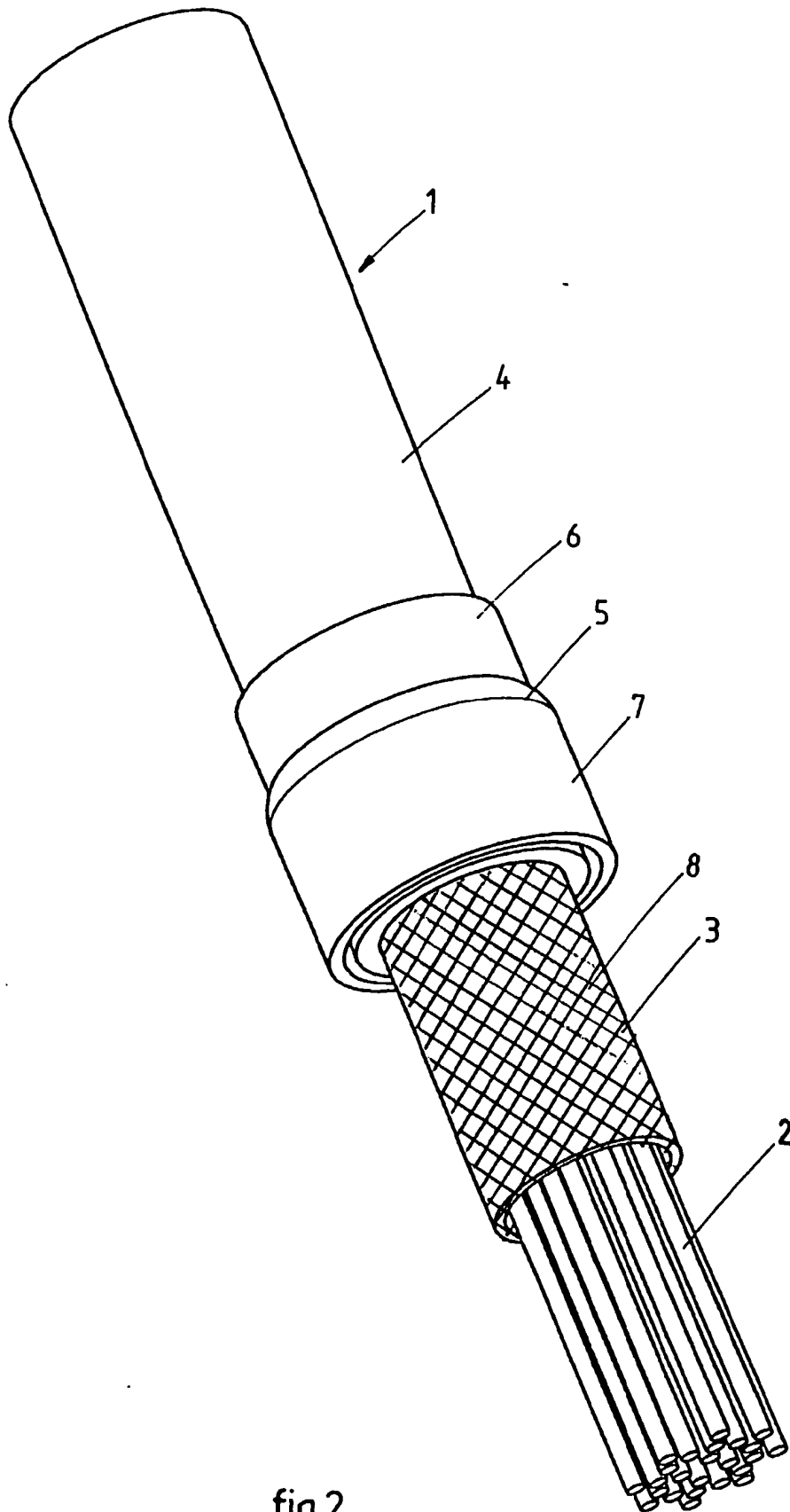


fig.2

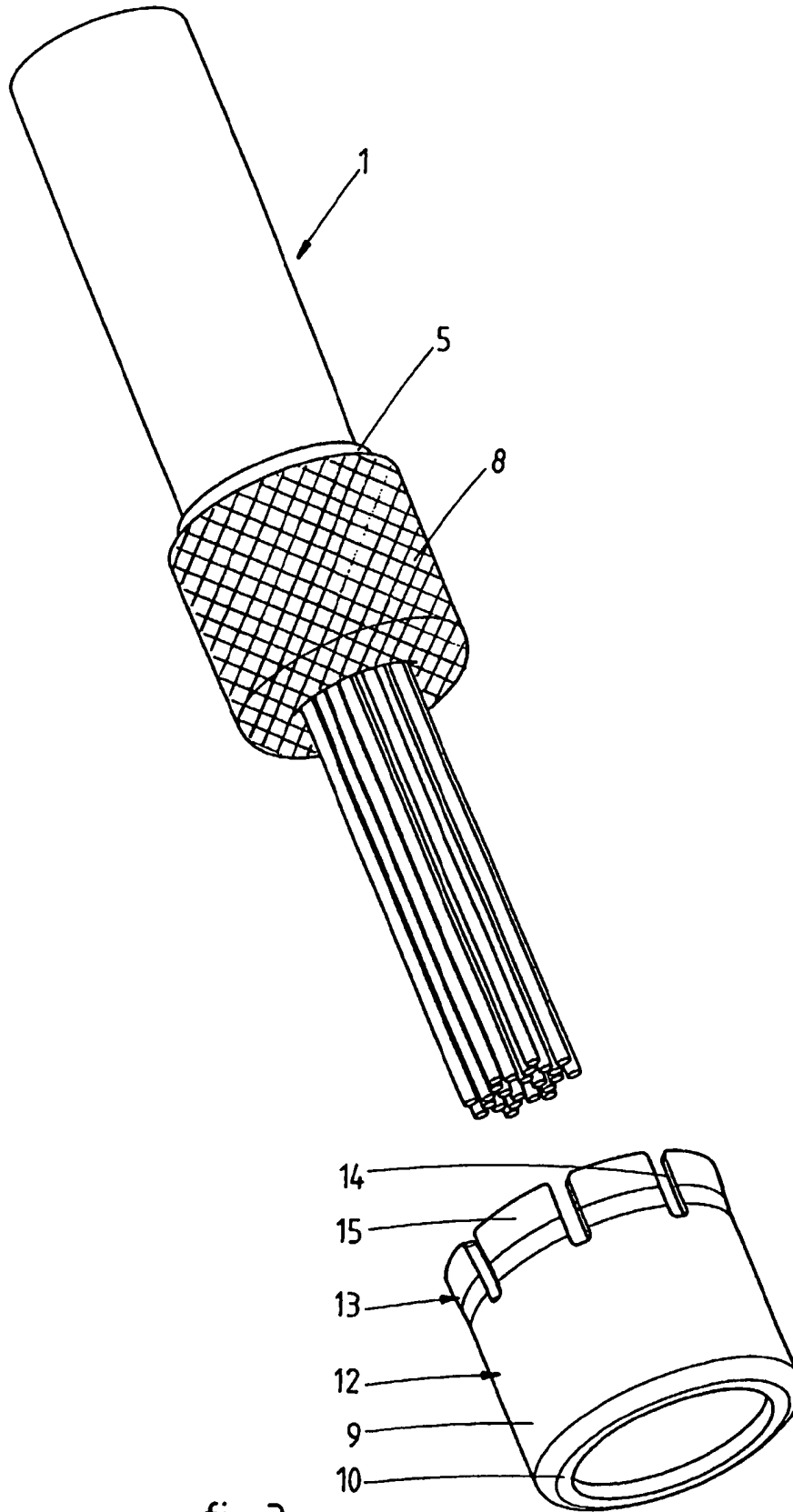


fig. 3

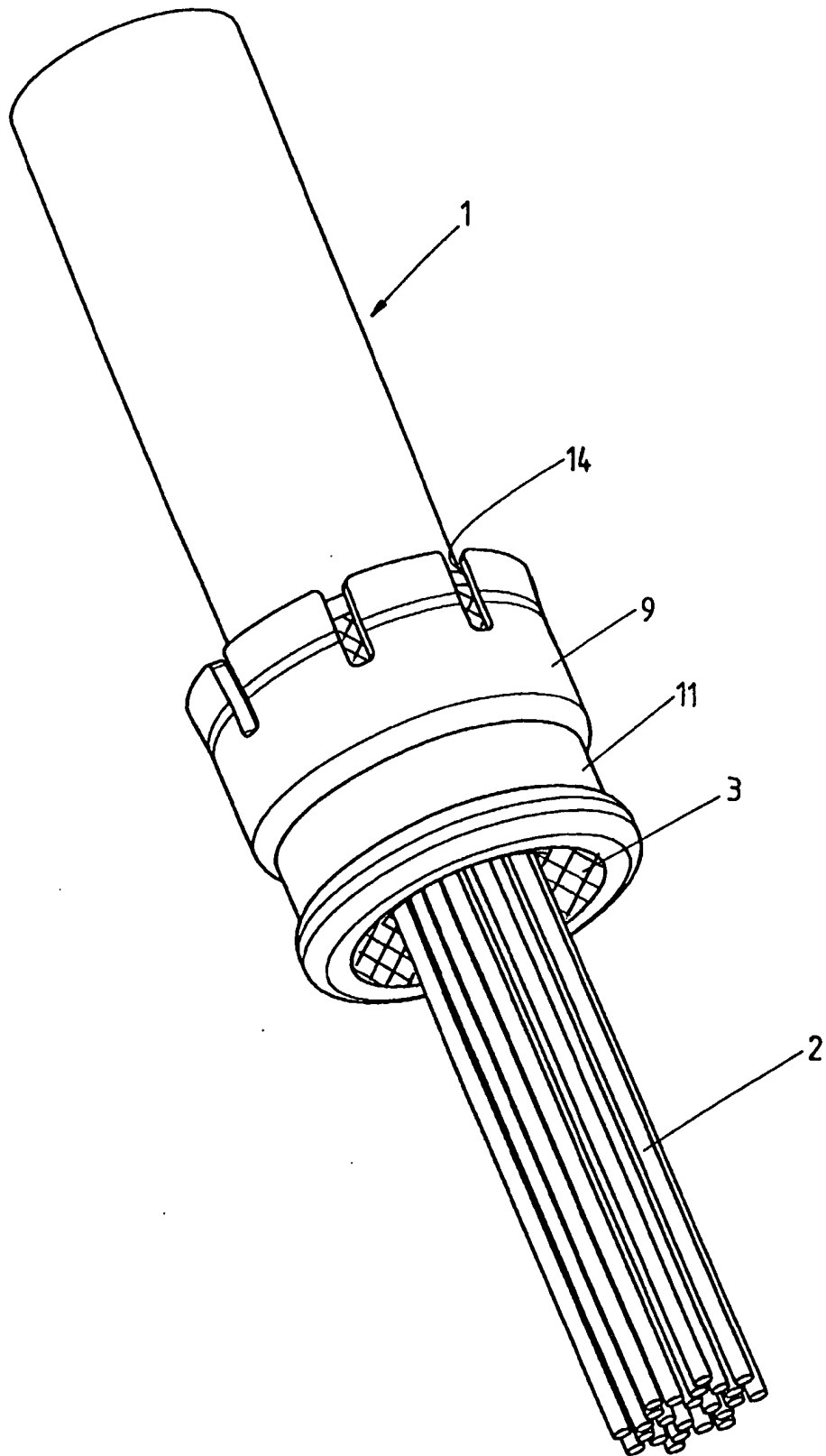


fig.4

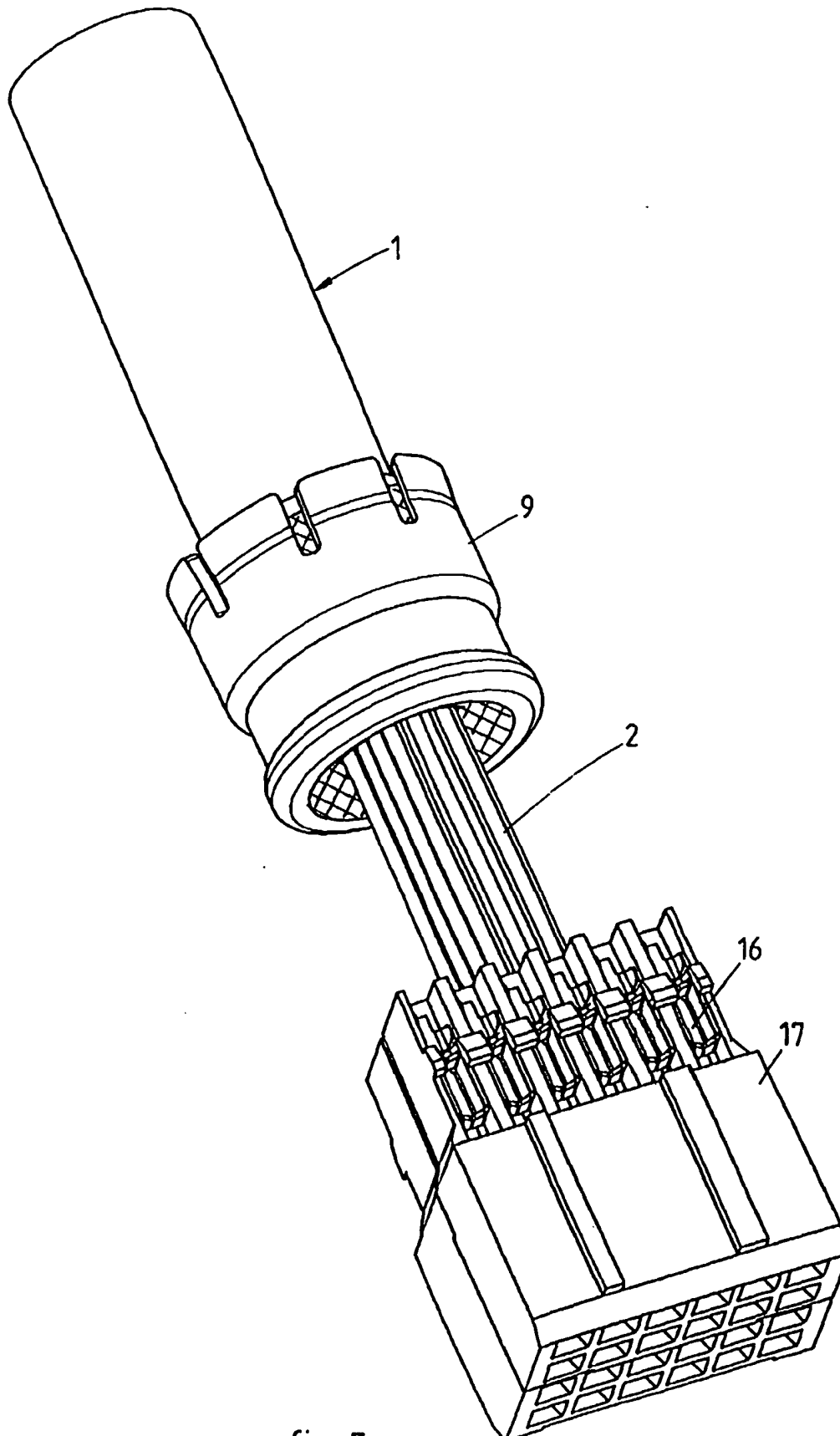


fig.5

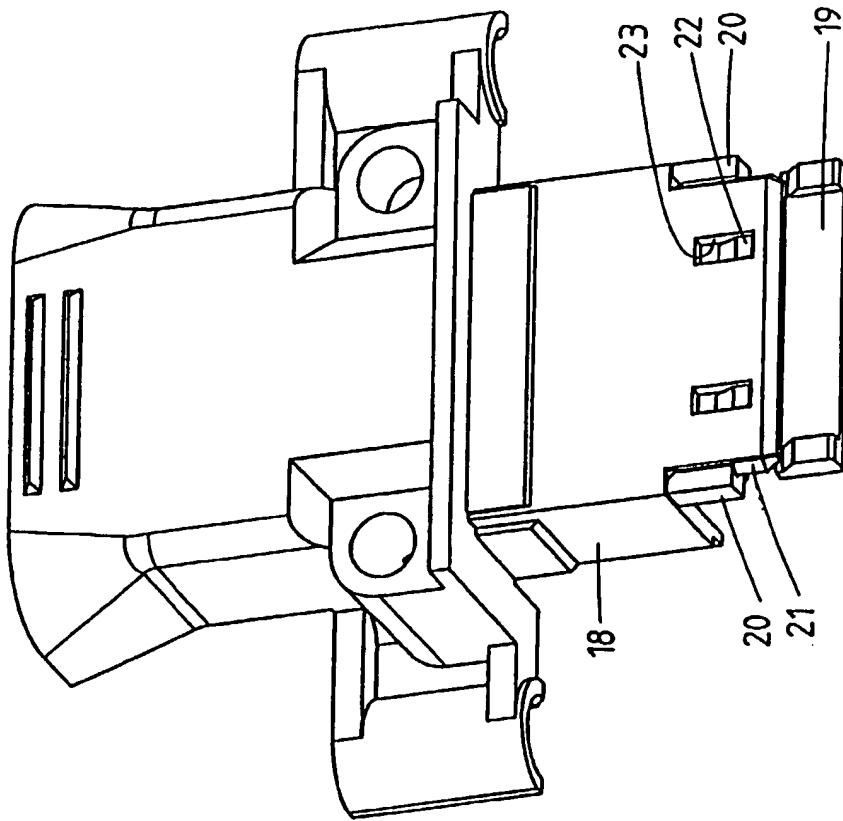


fig.6

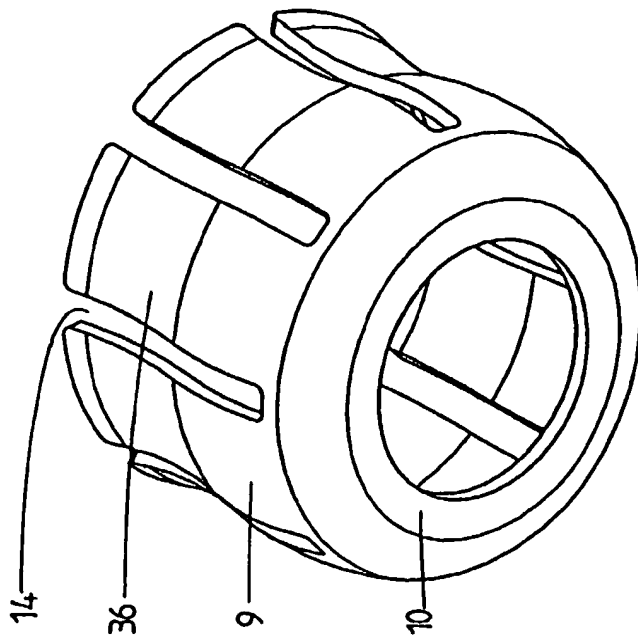


fig.12

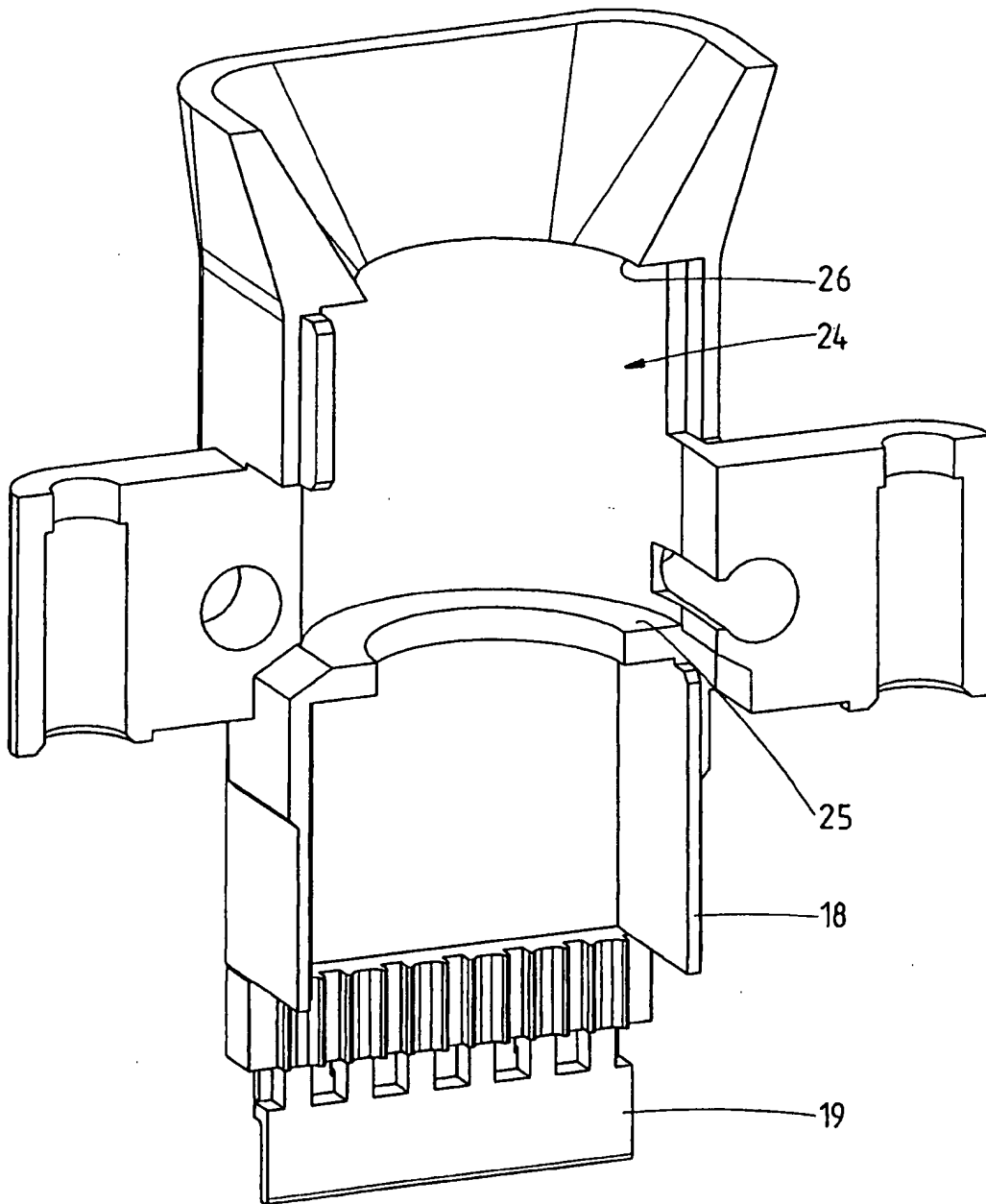


fig.7

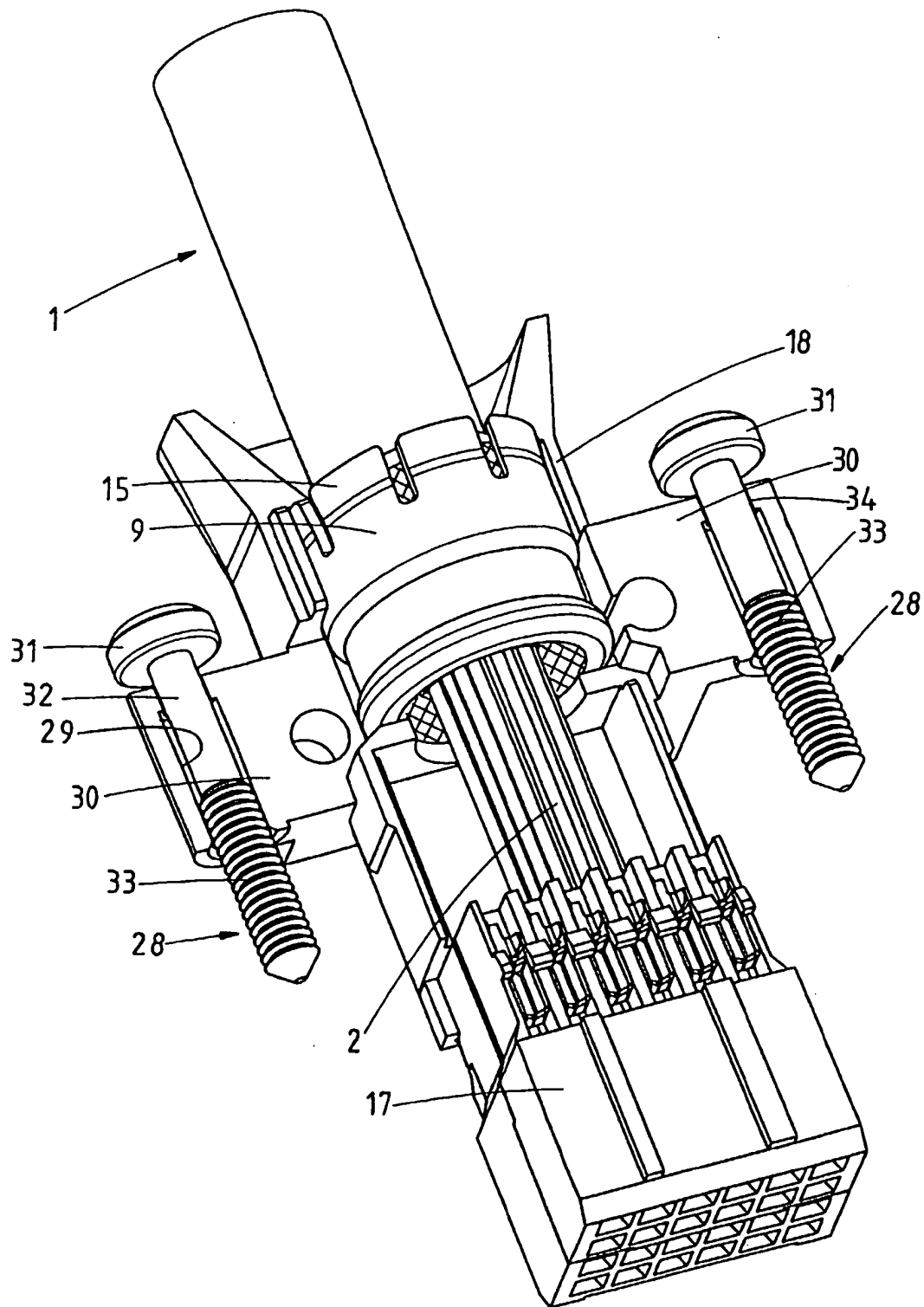


fig.8

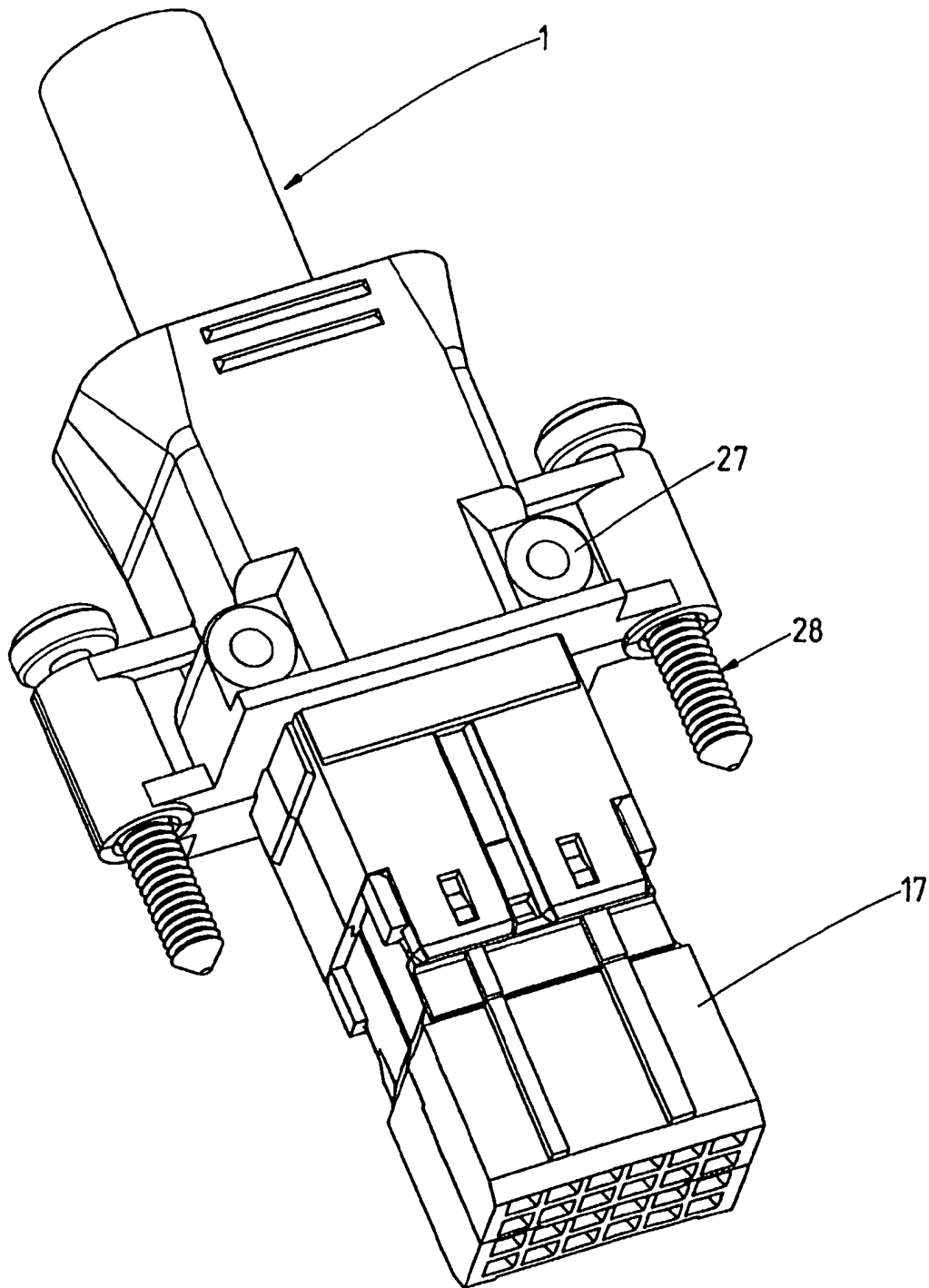


fig.9

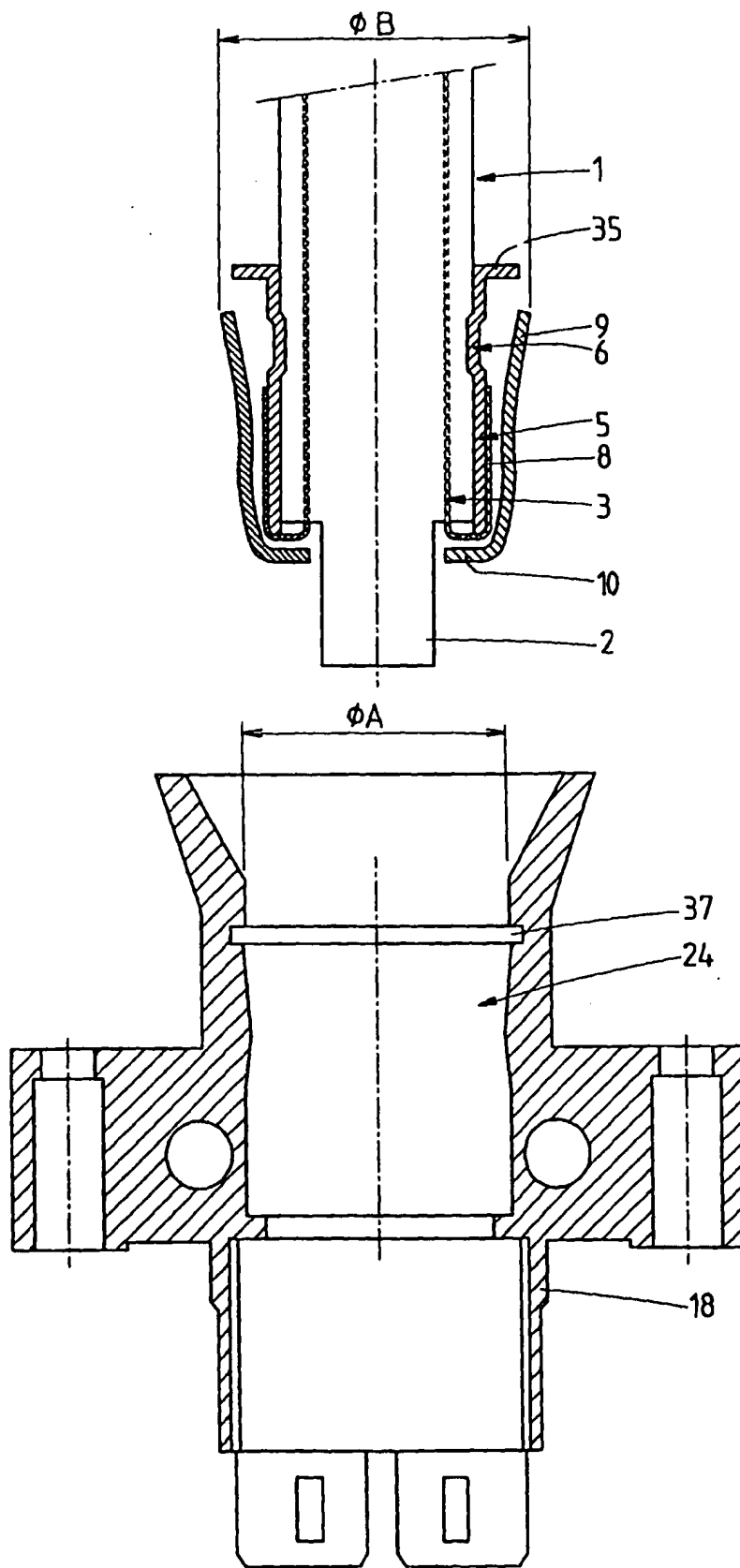


fig.10

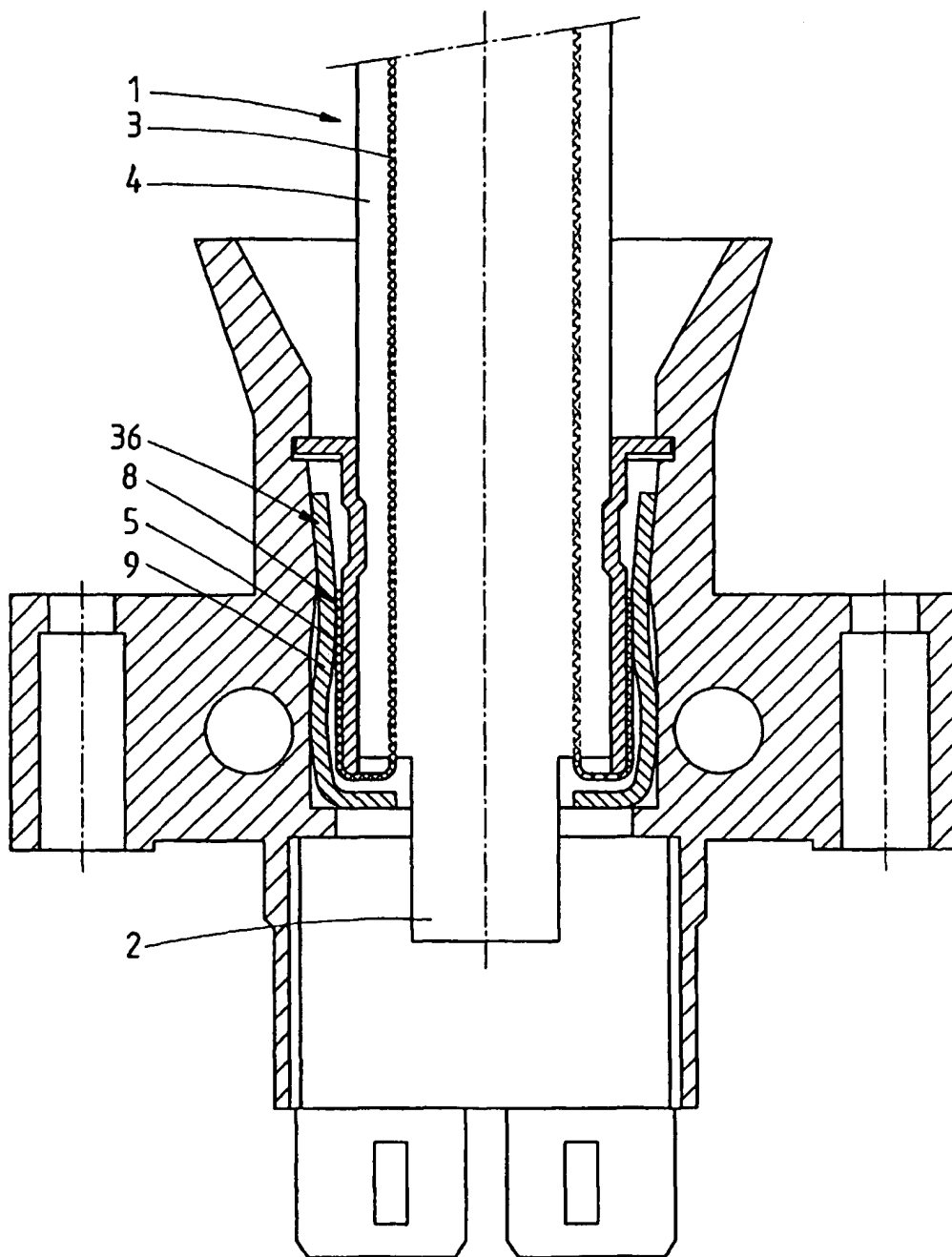


fig.11

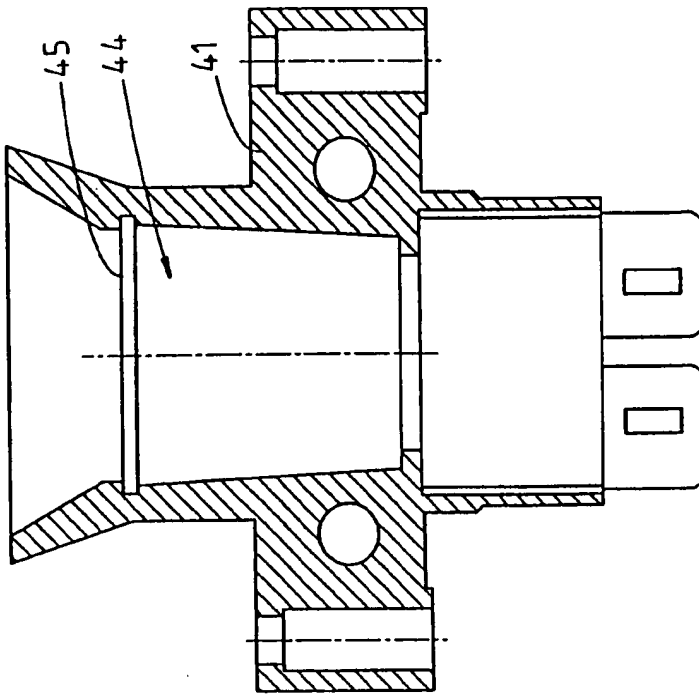


fig.14

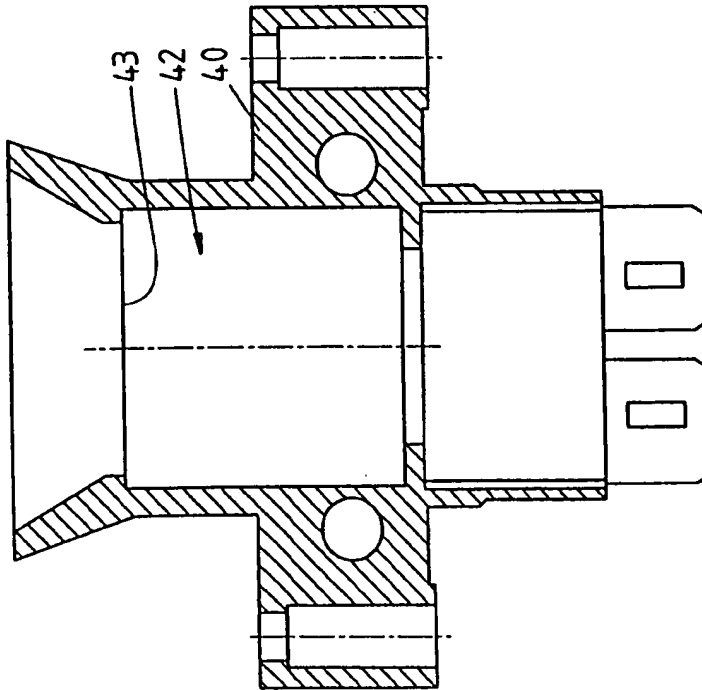


fig.13

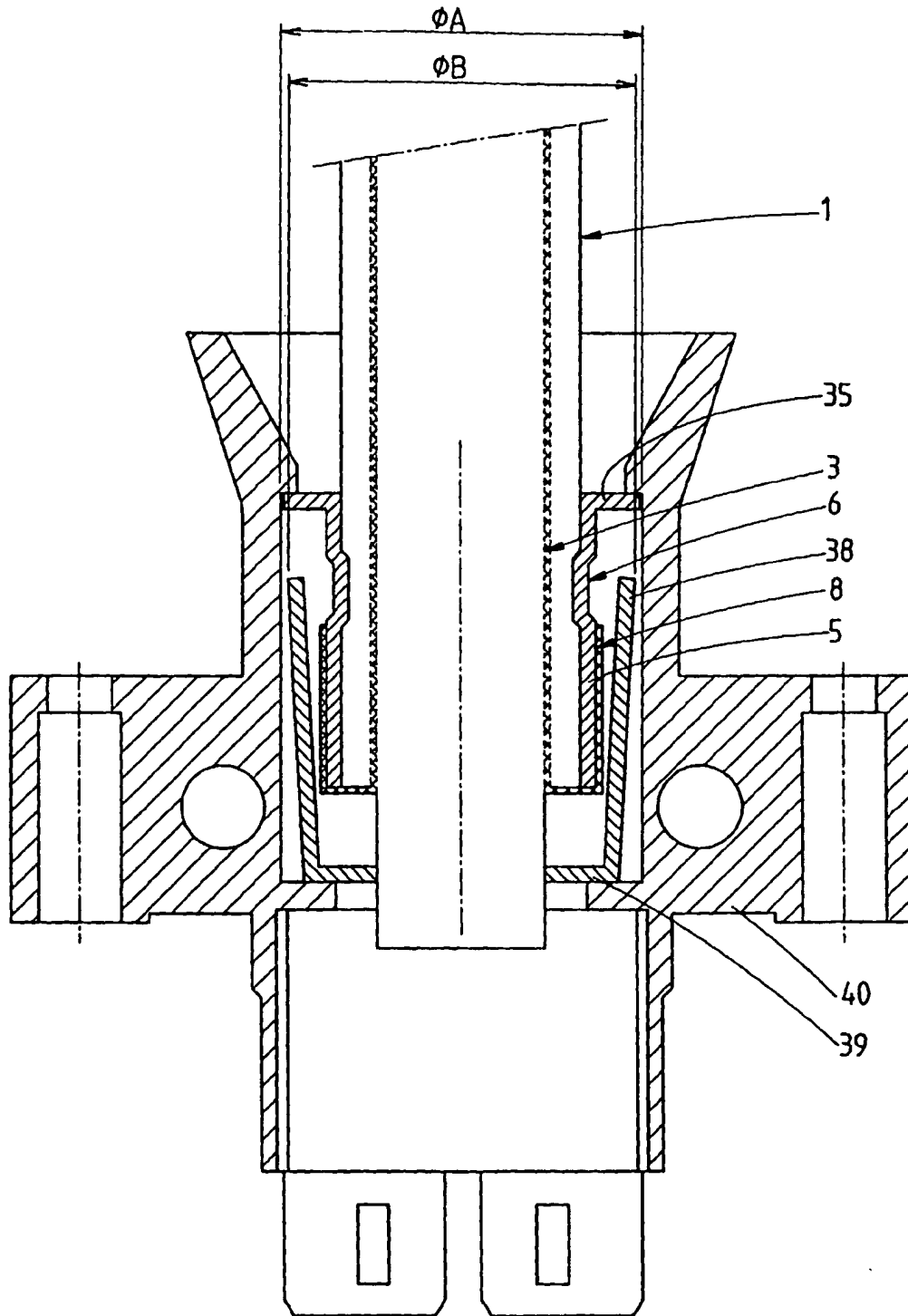


fig.15

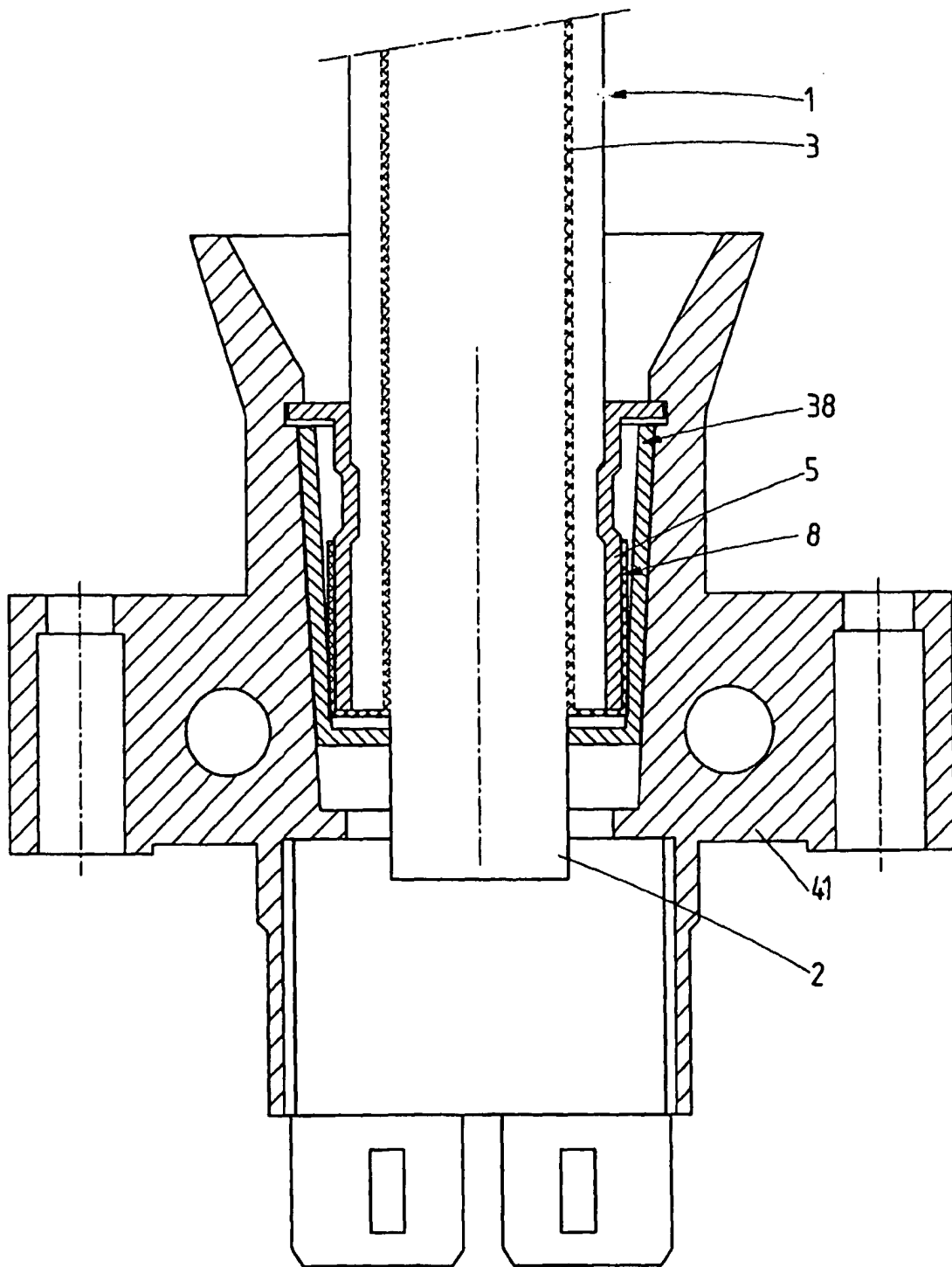


fig.16



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EUROPEAN SEARCH REPORT

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Place of search THE HAGUE		Date of completion of the search 19 November 1999	Examiner Salojärvi, K
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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